NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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NIGHT FLYING

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The choice of air routes for commercial exploitation, must depend to some extent on the type of flying which is possible, having regard to the nature of the country traversed and the extent of the landing facilities which have been provided. The effect of the possibility of flying at night is the most conspicuous example of such an influence over the location of air transport undertakings. Many routes which would be very attractive if it were possible to carry out the trips during the night are quite hopeless as long as all flying must be done by daylight.

It is obvious that the advantages of aerial travel on any really long journey, too long to be completed in a single day, are seriously diminished if it is impossible to continue operations on a 24-hour schedule. In going from coast to coast in the United States, for example, three days are required if no progress is made at night, and this offers relatively little gain over the speed of the best trains. By flying continuously, on the other hand, the trip could be accomplished in two nights and a day, and the loss of working time in going from New York to San Francisco, would be little more than the present loss in going from New York to Chicago.

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* Taken from "The Christian Science Monitor."

The New York-Chicago route itself furnishes another example of a line which cannot be exploited with real effectiveness except by night flying. The time between the two cities by air is about eight hours under commercial conditions, and if all of this time must be taken from the working day the effective speed of the service will be only a little greater, from the standpoint of the business man, than that of the limited trains which cover the distance in a total time of 20 hours, 12 of them at night. In fact, inability to carry on at night will seriously impair the value of any air service except those which run over combined land and water routes where changes of vehicle are now required or those which are especially favored by geographical circumstance in some one of the other ways summarized in last week's article.

Need of Lighted Fields.

Flying by night involves many special technical problems, and not all of them have been solved as yet. Night flying with express and mail has been undertaken in some instances, and is likely to continue, at least under the pressure of emergency, for chances of accident can be taken when the pilot flies alone and carries an inanimate cargo which would be inexcusable with a load of passengers who are not inclined to accept any special hazard. Reducing the subject to its simplest elements, it is evident that commercial night flying will be safe only when aircraft are absolutely insured against the possibility of having to land suddenly at a destination other than that intended, or alternatively, when

the provision of landing fields has become so extended that a pilot whose engine may stop will be sure of finding somewhere below him, near enough to be reached by an ordinary glide, a smooth and properly lighted field.

Contrary to general belief among non-fliers, the mere act of flying at night, the control of the machine in the air and the making of a landing on a field properly illumined by flood lights, offers but little difficulty. Flying at night with a clear sky is far easier than flying in the clouds by day, for the stars afford a means of holding a true course and of observing departures from an even keel which is lacking when among the clouds.

The Airship Possibilities.

At the present time there is only one way to secure complete protection against the possibility of a forced landing. Only by using an airship, the lift of which is independent of its motion through the air, does it become possible to dismiss the forced landing completely from thought as a potential form of trouble, and it is to the airship that we should look for much of our long-distance air transport at present.

By using a large number of power plants in an airplane, however, the probability of simultaneous failure of enough of them to make a landing necessary becomes at least exceedingly remote. The chief hope for the use of the airplane for carrying passengers at night and over difficult country therefore lies in the design of machines with at least five or six completely distinct power plants.

In any case it is obvious that the successful night-flying machine must be a very large one, not only im order to incorporate several engines as a safeguard against forced landings, but also to provide room for more commodious quarters for the passengers than are possible at present. Great strides have been made in catering to the comfort of the traveler by air, but if virtually continuous trips lasting 24 hours or more are to be undertaken, it is evident that something much more elaborate than the present cabins will be required.

Cost of Fields.

The second of the two possible means of making night flying safe, the provision of a large number of landing fields along the route, is simple and straightforward enough but rather expensive. The average annual cost of maintenance of a landing field large enough and well enough kept up to be of any real service amounts to at least $9000 a year, including interest on the original investment, and the cost of keeping up such a field every 10 miles along the route from New York to Chicago, would therefore be nearly $1,000,000 a year. In a few years, when civil flying is fairly under way, this may seem a very small sum for the benefits received, but it is far too large a burden to be undertaken by private capital at present.

Night flying over water is in some ways easier than flying over land. One can remain at a low altitude over water, as the surface is smooth and free from obstruction, and the moon on a

clear night gives all the light that a skillful pilot requires for safe landing. Navigation while traveling low and close to the shore is much aided by observation of the lighthouses, which serve quite as well for that purpose as do the lights of cities when flying over the land.

No one who has made a study of commercial flying can doubt the necessity of night flying or the certainty of its advent. It will come, however, only after the way has been paved by extensive work under easier conditions and after aeronautical engineers have risen to the occasion and produced types of passenger aircraft as far beyond any actually existing, in size, power and commodiousness, as the aircraft of today are beyond those of 10 years ago.